

REMARKS

Applicant thanks Examiner Ratcliffe for the analysis contained in the Office Action mailed May 3, 2006.

Claim Rejections Under 35 U.S.C. §102

Claims 1-3, 5-7 and 12-14 currently stand rejected under 35 U.S.C. §102 as being anticipated by Hirzel (4,671,650). Applicant has cancelled Claim 2 and has amended Claim 1 to include the elements of Claim 2. Claim 1 now refers to "more than one optical element being focused in a different direction and angled at a known angle relative to the body" and "calculating attitude using the known relative angles." Hirzel does not teach this. Hirzel uses two CCD sensors to capture images of the earth's surface to generate various ground distance signals which are then used to produce velocity signals, as well as the yaw, rotation, roll and ground track. The angle of the CCD sensors is not discussed. Hirzel therefore derives all measurements from two-directional differences in subsequent images. Hirzel does not contemplate using the angles between more than one optical element in calculating attitude, as is evidenced by the fact that the front images are processed to determine the longitudinal and lateral relative image position shifts to produce the maximum degree of correlation. It is apparent that during a maneuver in which the yaw or pitch has been varied, perfect correlation between images would be impossible. Hirzel has evidently contemplated this, and teaches a method by which these differences may be removed or averaged out in order to make calculations, then derives the yaw or pitch as a secondary calculation. However, by knowing the angle of each optical element, the apparatus in Claim 1 is able to use these differences to directly calculate the yaw or pitch. Claim 1 is therefore not anticipated by Hirzel. As Claims 3 and 5-7 depend upon Claim 1, these claims are also not anticipated.

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Claim 12 recites "calculating attitude using the known relative angles" between more than one optical elements, and is therefore not obvious based on similar arguments. As Claims 13 and 14 depend upon Claim 12, these claims are also not anticipated.

Claim Rejections under 35 U.S.C. §103

Claims 4, 9 and 10 currently stand rejected under 35 U.S.C. §103 as being unpatentable over Hirzel (4,671,650) in view of Hoschette (4,965,453). Claim 1, from which Claim 4 depends, refers to "calculating attitude using the known relative angles" between more than one optical elements, which is not taught by Hirzel based on arguments presented above, and Hoschette does not make up the deficiency. While the angles may be chosen by Hoschette, the purpose is not for calculating attitude, but rather to create overlapping areas, with the goal being to center the target. This is for the purpose of sensing a source of energy within a composite field of view, and adjusting the projectile orientation to locate and maintain the source within the central sector of the composite field of view. Furthermore, Hoschette does not teach image processing, where subsequent images are compared to collect data. Hoschette is able to make decisions based on a single image, which does not affect the decisions based on subsequent images. Thus, the teachings of Hoschette are directed toward a different problem. Hoschette does not teach, and is not concerned with, calculating attitude (or pitch, roll, and yaw). Claim 4 is therefore not obvious in light of Hirzel and Hoschette.

Claim 9 recites "calculating attitude using the known relative angles" between five optical elements, and is therefore not obvious based on similar arguments. As Claim 10 depends upon Claim 9, it would also not be obvious.

Claims 8, 11, and 15 currently stand rejected under 35 U.S.C. §103 as being unpatentable over Hirzel (4,671,650) in view of Falbel (5,189,295). Claims 1, 9 and 12, from which Claims 8, 11 and 15 respectively depend, each refer to "calculating attitude using the known

relative angles" between more than one (or five) optical elements. Based on arguments presented above, these claims are not anticipated by Hirzel, and Falbel does not make up the deficiency. Falbel teaches detecting fixed, known references to determine the roll, pitch and yaw of an object. There is no need to know the relative angles of any cameras, as it is the angle between various fixed, known references that is used. Furthermore, Falbel is not concerned with image processing, as all the necessary information may be determined from a single image, such that Hirzel and Falbel are directed toward different problems. As Claim 8 depends upon Claim 1, Claim 11 depends upon Claim 9, and Claim 15 depends upon Claim 12, these claims are not obvious.

Claim 11 is rejected under 35 U.S.C. §103 as being unpatentable over Hirzel in view of Hoschette and Falbel. Claim 11 depends upon Claim 9, which, based upon arguments presented above, is not obvious in light of Hirzel and Hoschette or Hirzel and Falbel, and the combination of all three does not make up the deficiency. There is no motivation to use known angles of optical elements to determine attitude. Fixing cameras at known angles would defeat the purpose of Falbel, while Hoschette is unconcerned with measuring attitude, and angles each camera merely to determine the location of its target. Furthermore, both Falbel and Hoschette do not teach image processing as each captured image is used independently, as argued above. Claim 11 is therefore not obvious.

CONCLUSION

In view of the foregoing arguments, applicant respectfully submits that the present application is now in condition for allowance. Early action to that end is requested.

Respectfully submitted,

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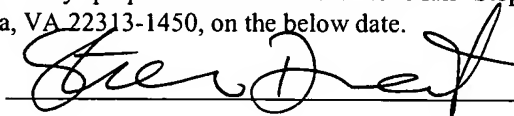


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